Name Key Class Date

7-6 Practice

Natural Logarithms

Write each expression as a single natural logarithm.

1. $\ln 16 - \ln 8$

$= \ln\left(\frac{16}{8}\right)$

$= \ln 2$

2. $3\ln 3 + \ln 9 - 2\ln 2$

$= \ln 27 + \ln 9 - \ln 4$

$= \ln\frac{(27)(9)}{4} = \ln\frac{243}{4}$

3. $a\ln 4 - \ln b$

$\ln\frac{4^a}{b}$

4. $\frac{1}{3}\ln 8 + \ln x$

$= \ln 2x$

5. $3\ln a - b\ln 2 - \ln c$

$\ln\frac{a^3}{2^b c}$

6. $2\ln 4 - \ln 8$

$= \ln\frac{16}{8}$

$= \ln 2$

Solve each equation. Check your answers. Round your answer to the nearest hundredth.

7. $4\ln x = -2$

$\ln x = -\frac{1}{2}$

$e^{-1/2} = x$

$x = 0.61$

8. $2\ln(3x-4) = 7$

$\ln(3x-4) = \frac{7}{2}$

$e^{7/2} = 3x-4$

$e^{7/2}+4 = 3x$

$\frac{e^{7/2}+4}{3} = x$

$12.37 = x$

9. $\ln x + \ln 3x = 14$

$\ln 3x^2 = 14$

$e^{14} = 3x^2$

$\frac{e^{14}}{3} = x^2$

$\pm\sqrt{\frac{e^{14}}{3}} = x$

$x = 633.14$

10. $3\ln e^{2x} = 12$

$\ln e^{2x} = 4$

$2x \ln e = 4$

$2x = 4$

$x = 2$

Note $\ln e = 1$

11. $\ln\frac{2x}{41} = 2$

$e^2 = \frac{2x}{41}$

$41e^2 = 2x$

$\frac{41}{2}e^2 = x$

$151.48 = x$

12. $\ln(2x-1)^2 = 4$

$e^4 = (2x-1)^2$

$\pm\sqrt{e^4} = 2x-1$

$\pm e^2 + 1 = 2x$

$\frac{\pm e^2+1}{2} = x$

$x = 4.19$ or -3.19

Use natural logarithms to solve each equation. Round your answer to the nearest hundredth.

13. $4e^x = 10$

$e^x = \frac{5}{2}$

$\ln e^x = \ln\frac{5}{2}$

$x = \ln\left(\frac{5}{2}\right)$

$x = 0.92$

14. $5e^{6x+3} = 0.1$

$e^{6x+3} = 0.02$

$\ln e^{6x+3} = \ln(0.02)$

$6x+3 = \ln(0.02)$

$6x = \ln(0.02) - 3$

$x = \frac{\ln(0.02)-3}{6}$

$x = -1.15$

15. $e^{\frac{x}{5}} = 32$

$\ln e^{x/5} = \ln 32$

$x/5 = \ln 32$

$x = 5\ln 32$

$x = 17.33$

16. $e^{x+6} + 5 = 1$

$e^{x+6} = -4$

$\ln e^{x+6} = \ln(-4)$

No solution

Simplify each expression.

17. $\ln e^4$

$= 4$

18. $5\ln e^5$

$= 5(5) = 25$

19. $\frac{\ln e^2}{2}$

$= \frac{2}{2} = 1$

20. $\ln e^{100}$

$= 100$